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Modelling the runout of subaerial to subaqueous rock avalanches in Milford Sound/Piopiotahi, New Zealand

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Rock avalanches are large volume ($> 10^6$ m^3), extremely rapid, and highly mobile landslides that on entering fjords, lakes and the ocean, can trigger tsunamis. The tsunamis can have far-reaching impacts beyond the extent of the initiating rock avalanche, posing a risk to coastal communities. Modelling the runout of terrestrial rock avalanches into the water can improve the understanding of emplacement processes, particularly over changes in medium (from air to water). It can also provide input parameters, including impact velocity, slide thickness distribution, slide mass, and runout distance, for numerical tsunami modelling. Where there are groups of closely spaced rock avalanches, these provide a rheological envelope for key model parameters that can aid in scenario planning for future events.

Here we present the modelling results of a group of post-glacial rock avalanche deposits in Milford Sound/Piopiotahi. Using the single-phase, depth-averaged numerical model DAN3D, we simulate a representative subset of rock avalanches identified by multibeam echosounder (MBES) on the fjord bottom. Initial results suggest that modelling the change from air to water is effectively achieved by assuming a difference in the basal rheological parameters along the flow path at the water level. The results of the numerical modelling provide information on the rock avalanche dynamics including flow velocity, thickness distribution, and frontal geometry as the avalanche enters the water. These results can form the basis for tsunami modelling.